What is claimed is:

1. A molding die for molding an optical element, comprising:

a die base body formed by shaping an amorphous alloy having a super-cooled liquid phase, and

a die face formed by applying a die face forming process onto a part of the die base body and used to form an optical surface of the optical element or a dimensional reference surface.

2. The molding die of claim 1, wherein the die base body is formed by softening the amorphous alloy with heat and by pressing the softened amorphous alloy into the form of the die base body.

3. The molding die of claim 1, wherein the die face forming process is a shaving process to shave the part of the die base body.

4. The molding die of claim 3, wherein the shaving process is a cutting process.

5. The molding die of claim 4, wherein the cutting process is conducted with a diamond cutting tool.

6. The molding die of claim 3, wherein the shaving process is a grinding process.

7. The molding die of claim 1, wherein the die face forming process is a process to apply an exposing process and a developing process onto the part of the die base body.

8. The molding die of claim 1, wherein the die face forming process is a shaving process to shave the part of the die base body and a process to apply an exposing process and a developing process onto the part of the die base body.

9. The molding die of claim 1, wherein the die face has a plurality of protrusions or a plurality of hollows so that a plurality of hollows or a plurality of protrusions are transferred from the die face and formed onto the optical surface of the optical element in correspondence with the plurality of protrusions or the plurality of hollows on the die face.

10. The molding die of claim 9, wherein the plurality of hollows or the plurality of protrusions on the optical surface of the optical element form a fine structure having a equivalent refractive index region.

11. The molding die of claim 9, wherein the plurality of hollows or the plurality of protrusions on the optical surface of the optical element form a fine structure to create a reflection preventing effect.

12. The molding die of claim 9, wherein the plurality of hollows or the plurality of protrusions on the optical surface of the optical element form a fine structure to generate a structural double refraction.

13. The molding die of claim 9, wherein the plurality of hollows or the plurality of protrusions on the optical surface of the optical element form a fine structure having a resonance region.

14. The molding die of claim 9, wherein the plurality of hollows or the plurality of protrusions on the optical surface of the optical element have a function to adjust a

change in aberration due to a wavelength change of a light source to emit a light flux to the optical element.

15. The molding die of claim 9, wherein the plurality of hollows or the plurality of protrusions on the optical surface of the optical element have a function to adjust a change in aberration due to a temperature change.

16. The molding die of claim 9, wherein the plurality of hollows or the plurality of protrusions on the optical surface of the optical element form a ring-shaped diffractive zones.

17. The molding die of claim 9, wherein the amorphous alloy has a hardness Hv of 300 or more in the room temperature.

18. The molding die of claim 9, wherein the amorphous alloy has a hardness Hv of 700 or less in the room temperature.

19. The molding die of claim 9, wherein the composition of the amorphous alloy contains palladium.

20. The molding die of claim 9, wherein the composition of the amorphous alloy contains palladium with a rate of 30 mol% to 50 mol%.

21. The molding die of claim 9, wherein the composition of the amorphous alloy contains one of copper, nickel, phosphor, zirconium, an aluminum with a rate of 3 mol% or more.

22. An optical element, comprising:

an optical surface on which a plurality of protrusions or a plurality of hollows are formed,

wherein the plurality of protrusions or a plurality of hollows are arranged with a pitch smaller than a wavelength of light transmitting through the optical surface.

23. The optical element of claim 22, wherein the plurality of hollows or the plurality of protrusions on the optical surface of the optical element form a fine structure having a equivalent refractive index region.

24. The optical element of claim 22, wherein he plurality of hollows or the plurality of protrusions on the optical

surface of the optical element form a fine structure to create a reflection preventing effect.

25. The optical element of claim 22, wherein the plurality of hollows or the plurality of protrusions on the optical surface of the optical element form a fine structure to generate a structural double refraction.

26. The optical element of claim 22, wherein the plurality of hollows or the plurality of protrusions on the optical surface of the optical element form a fine structure having a resonance region.

27. The optical element of claim 22, wherein the optical element comprises a lens.

28. The optical element of claim 22, wherein the optical element is made of a plastic material.

29. The optical element of claim 22, wherein the optical element is made of a glass material.

30. A master die to form a molding die used for molding an optical element, comprising:

a master die base body; and

a master die face having a plurality of protrusions or a plurality of hollows so that a plurality of hollows or a plurality of protrusions are transferred from the master die face and formed on a die face of the molding die in correspondence with the plurality of protrusions or the plurality of hollows on the master die face.

31. The master die of claim 30, wherein the plurality of protrusions or the plurality of hollows are formed by applying an exposing process and a developing process on the master die face.

32. The master die of claim 31, wherein the master die base body is made of a material having a hardness Hv of 300 or more in the temperature of 500 °C.

33. The master die of claim 31, wherein the master die base body is made of a quartz.

34. The master die of claim 31, wherein the master die base body is made of a mono crystal silicon.

35. The master die of claim 31, wherein the master die base body is made of a material containing a tungsten carbide.